PROGRAM CHANNEL UNITS

GENERAL DESCRIPTION

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1. GENERAL

1.01 This Section provides a general description of the ITT D448 5-kHz transmitting program channel unit (PGCU5T), 628320 (Fig. 1); 5-kHz receiving program channel unit (PGCU5R), 628330; 8-kHz transmitting program channel unit (PGCU8T), 628322; and 8-kHz receiving program channel unit (PGCU8R), 628332 (Fig. 2), to the functional block diagram level.

1.02 Whenever this Section is reissued, the reasons for reissue will be listed in this paragraph.

1.03 The PGCU5T/PGCU8T provide the transmitting end of a 5-kHz/8-kHz program channel, while the PGCU5R/PGCU8R provide the receiving end of the channel. The channel units provide 1-way service without signaling functions. The units are used in the D448 PCM trunk carrier system. Both the 5-kHz and the 8-kHz channel units can be used to facilitate short-haul or temporary remote pick-ups, secondary studio links, network access links, and amplitude modulation (AM) studio-transmitter links. Some of the major applications for the program channel units are listed in Table A.

2. DESCRIPTION

2.01 Each unit mounts in the 19- and 23-inch D448 multiplex shelves. Installation procedures for the units are provided in Section ITTR-18-460. The unit shelf position is designated N. If the 5-kHz unit is mounted in the N position, the twelfth position numerically higher (designated N + 12) must also be dedicated for 5-kHz service. If the 8-kHz unit is mounted in the N position, the eighth and sixteenth positions numerically higher (designated N + 8 and N + 16) must also be dedicated for 8-kHz service. Blank card units (BCUs), 628099, should be placed in the blank shelf slots dedicated to program channel service. Although D3 sequencing is recom-

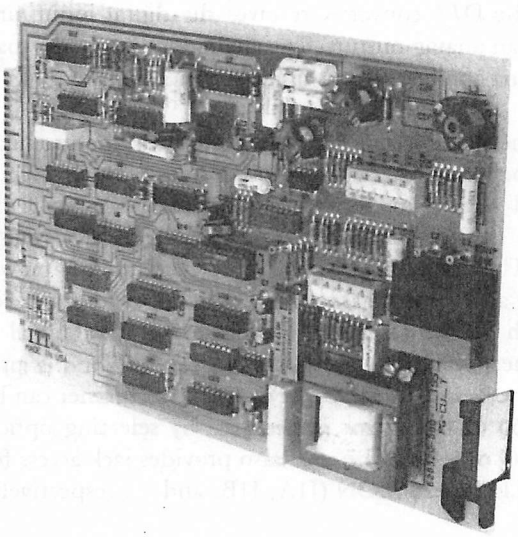

Fig. 1—PGCU5T, 628320

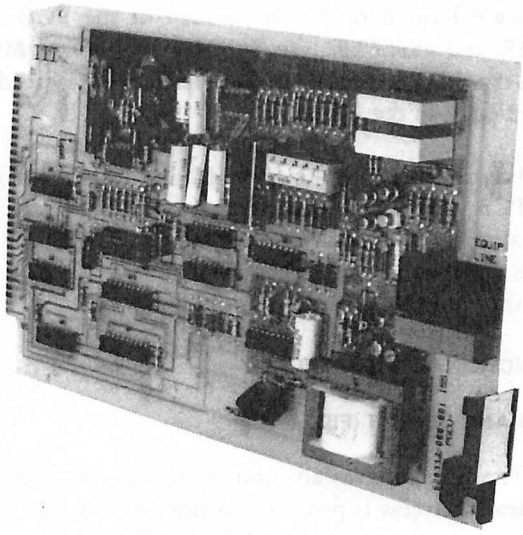

Fig. 2—PGCU8R, 628332

mended, other sequences will work if proper shelf slot sequence is determined. Fig. 3 provides information on shelf slot sequencing.

TABLE A

TRANSMITTING END (FROM)	RECEIVING END (TO)
Serving central office (C.O.)	Serving C.O. in the same exchange
Serving C.O.	Serving C.O. in metropolitan exchange area
Serving C.O.	Long lines
Serving C.O.	Associated company Program Operating Center (POC)
POC	POC
Serving C.O.	Customer premises
Customer premises	Serving C.O.
Remote pick-up	Serving C.O.
Temporary pick-up	Serving C.O.
AM studio	AM transmitter

2.02 Each unit is available in Group -0 only.

2.03 Each unit consists of an epoxy-glass printed circuit board (PCB) and associated circuit components. The lower front edge of the PCB is fitted with a handle to facilitate insertion and removal of the unit from the shelf. An identification strip on the handle face indicates the unit mnemonic (PGCU5T, PGCU5R, PGCU8T, and PGCU8R), last three digits of model number, last three digits of the part number, and issue letter. The part number and issue letter are also located on the component side of the PCB.

2.04 On PGCU5T and PGCU8T, the EQUIP, LINE, and EQ OUT bantam-type access jacks (J1A, J1B, and J2) are located on the front edge of the PCB. On PGCU5R and PGCU8R, the EQUIP, LINE, and MON bantam-type access jacks (J1A, J1B, and J2) are located on the front edge of the PCB.

2.05 Printed circuit wiring is etched on both sides of the PCB. The unit inputs and outputs terminate in gold-plated contacts on the rear edge of the PCB. These contacts mate with a 60-pin contact edge connector on the rear of the multiplex shelf.

3. FUNCTIONAL OPERATION

PGCU5T AND PGCU8T (FIG. 4)

3.01 The unit receives an input signal on the T and R leads. Access is provided to this signal via EQUIP and LINE access jacks (J1A and J1B, respectively). The unit provides a selectable impedance on the transformer input of 150 or 600 ohms, which is selected by option screws [150] and [600]. The signal is transformer coupled and applied to an attenuation network which provides DIP switch options which allow input signal attenuation of up to 31 dB (in 1-dB steps). The attenuated signal is passed through a low-pass filter to the equalizer. Equalizer DIP switch options [+1] through [+16] are field selected to provide optimum circuit coupling to the cabling between the customer drop and the input of the transmit program channel unit.

3.02 The equalized signal is applied to the transmit (TX) sampling gate. After the signal is sampled, the TX sampling gate applies the signal to the analog-to-digital (A/D) converter. The digital signal is applied to the timing and synchronization circuit which conditions the signal for the parallel-to-serial converter. The converter receives the 8-bit parallel input and provides a serial output for application to the TX AND gate. The output from the TX AND gate is then applied to the D448 common equipment via transmit logic unit (TLU).

PGCU5R AND PGCU8R (FIG. 5)

3.03 The unit receives a serial data input from the receive logic unit (RLU) via the receive (RX) AND gate. The unit converts the serial data to parallel data via the serial-to-parallel converter. The parallel data is clocked and provided with the appropriate timing/synchronization and is applied to the latch.

3.04 The latch, under control of the phase lock loop synthesizer, provides a feedback path for adjusting the data pulse rate into the digital-to-analog (D/A) converter. The D/A converter receives the digital input and provides an analog output. This analog output is low-pass filtered and applied to the variable gain amplifier.

3.05 The variable gain amplifier supplies the attenuation network with an amplified input. This amplified signal can be reduced up to 31 dB (in 1-dB steps) by attenuation DIP switch options [−1] through [−16]. The attenuated signal is applied to the power amplifier and de-emphasis circuit which provides a feedback path to the variable gain amplifier. The signal is transformer coupled to the output of the unit and is present on the T and R leads. The output transformer can be set for 150 or 600 ohms impedance by selecting option screw [150] or [600]. The unit also provides jack access for EQUIP, LINE, and MON (J1A, J1B, and J2, respectively) functions.

D448 BLANK CARD UNIT
CONDENSED INSTALLATION INSTRUCTIONS

PROGRAM CHANNELS						
PGCU IN SLOT	PUT BCUs IN SLOTS					
	D1D SEQUENCE		D2 SEQUENCE		D3 SEQUENCE	
	5 kHz	8 kHz	5 kHz	8 kHz	5 kHz	8 kHz
1	7	5 & 9	2	7 & 10	13	9 & 17
2	8	6 & 10	1	8 & 9	14	10 & 18
3	9	7 & 11	4	6 & 12	15	11 & 19
4	10	8 & 12	3	5 & 11	16	12 & 20
5	11	1 & 9	6	4 & 11	17	13 & 21
6	12	2 & 10	5	3 & 12	18	14 & 22
7	1	3 & 11	8	1 & 10	19	15 & 23
8	2	4 & 12	7	2 & 9	20	16 & 24
9	3	1 & 5	10	2 & 8	21	1 & 17
10	4	2 & 6	9	1 & 7	22	2 & 18
11	5	3 & 7	12	4 & 5	23	3 & 19
12	6	4 & 8	11	3 & 6	24	4 & 20
13	19	17 & 21	14	19 & 22	1	5 & 21
14	20	18 & 22	13	20 & 21	2	6 & 22
15	21	19 & 23	16	18 & 24	3	7 & 23
16	22	20 & 24	15	17 & 23	4	8 & 24
17	23	13 & 21	18	16 & 23	5	1 & 9
18	24	14 & 22	17	15 & 24	6	2 & 10
19	13	15 & 23	20	13 & 22	7	3 & 11
20	14	16 & 24	19	14 & 21	8	4 & 12
21	15	13 & 17	22	14 & 20	9	5 & 13
22	16	14 & 18	21	13 & 19	10	6 & 14
23	17	15 & 19	24	16 & 17	11	7 & 15
24	18	16 & 20	23	15 & 18	12	8 & 16
Allowed: Mode 1, 2, or 3 with local or loop timing.						
Not Allowed: Any unit requiring more than 1 channel slot cannot share the same BCU slot.						

DSODP/56K AND OCUDP/56K CHANNELS (D3 SEQUENCE) (with error correction feature enabled)										
If DSODP or OCUDP is in slot:	1	2	3	4	. . . .	21	22	23	24
Put this BCU in slot:	2	3	4	5	. . . .	22	23	24	1

Fig. 3—BCU, 628099, Shelf Slot Sequencing (BCU Label)

4. OPTIONS

4.01 Each unit is equipped with screw-down options for selecting the impedance of the input or output transformer and DIP switch options for setting the attenuation. The transmit units are also equipped with equalizer DIP switch options. Refer to Section ITTR-18-460 for detailed information on option selection.

4.02 The multiplex shelf provides options on the backplane which control the CGA timing of the terminal. Refer to Section ITTR-18-405 (for shelves mounted in 23-inch bays) or ITTR-18-406 (for shelves mounted in 19-inch bays) for option selection information on these options.

5. RESTRICTIONS

5.01 The units are end-to-end compatible with the companion unit mounted in the ITT D448 multiplex terminal, and with WE D3- and D4-type units.

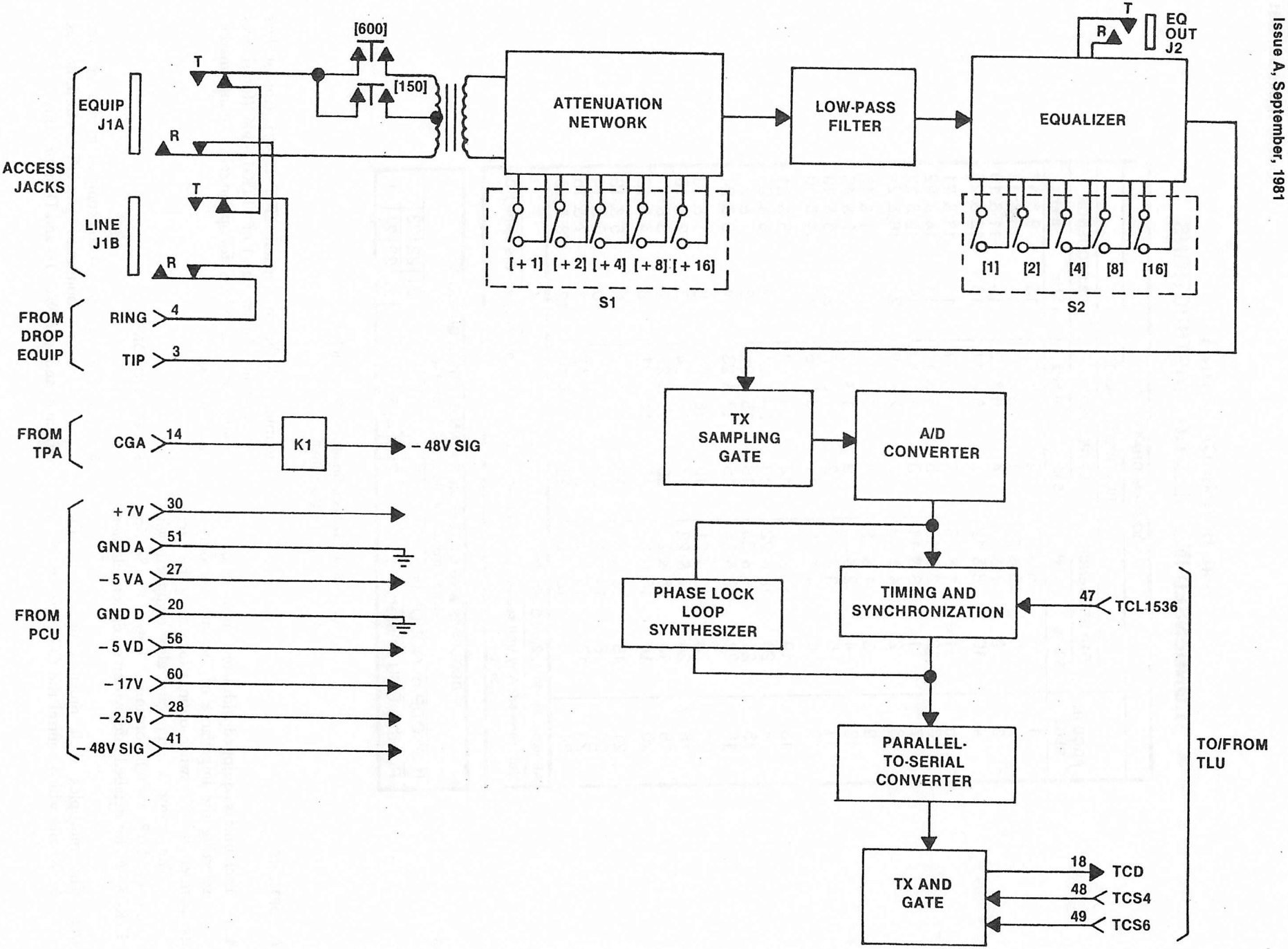

Fig. 4—PGCU5T, 628320, and PGCU9T, 628322, Functional Block Diagram

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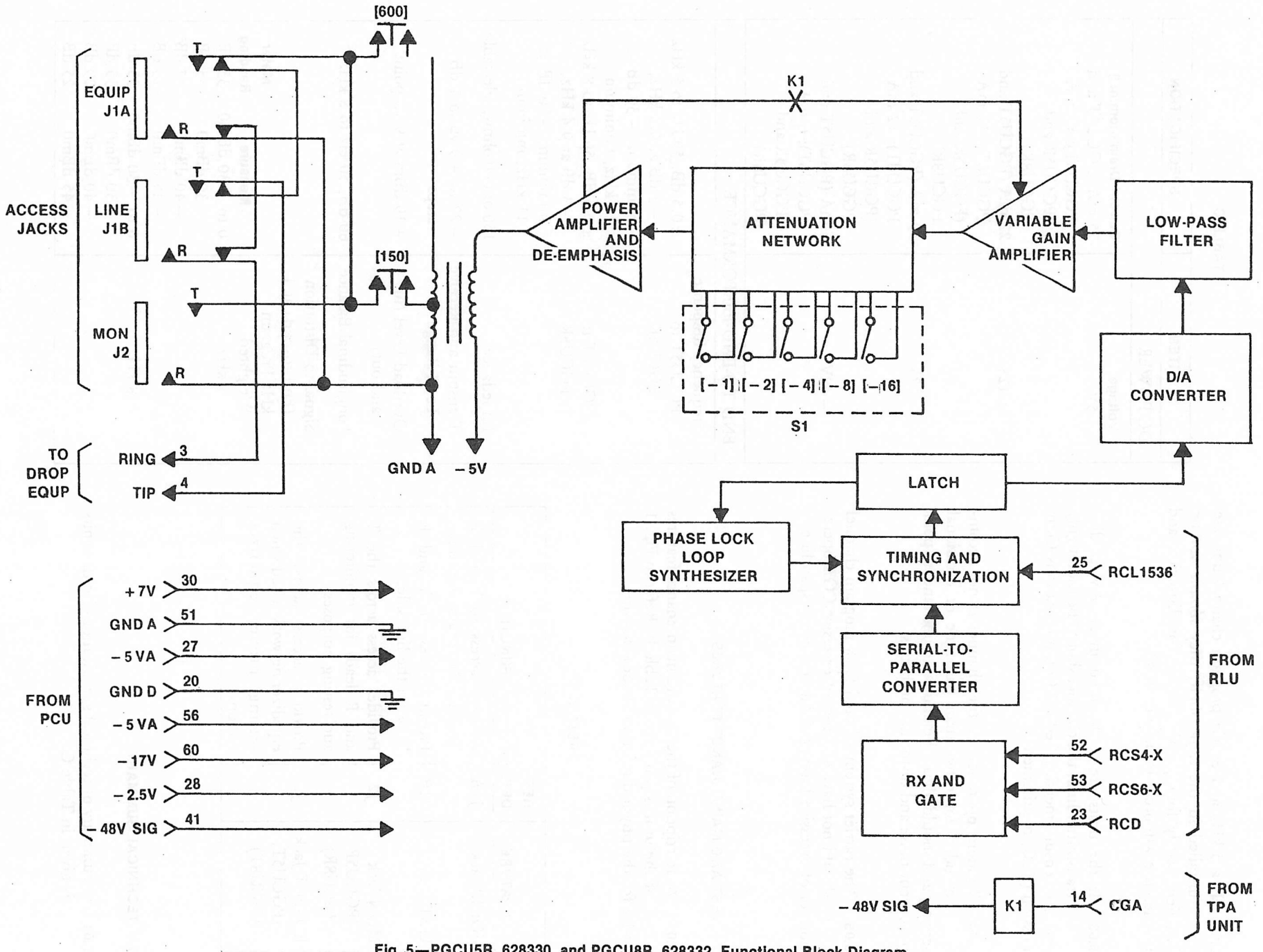

Fig. 5—PGCU5R, 628330, and PGCU8R, 628332, Functional Block Diagram

5.02 If a 5-kHz and 8-kHz program channel unit are installed in the same shelf, they *should not* be installed exactly four positions apart, or distortion and interference will occur in both channels.

5.03 If the units are to be used in an AM studio-transmitter link, the channel should be thoroughly tested to ensure meeting Federal Communications Commission (FCC) requirements.

5.04 Tandem operation of the channel is not recommended for other than part-time or occasional service, and should always be limited to one tandem point to prevent noise and distortion problems.

5.05 The carrier system selected for a program channel should not have a history of excessive CGA operations or of excessive bipolar violations on the span line.

6. TEST AND MAINTENANCE FEATURES

6.01 A description of the test and maintenance features of the unit is provided in Table B. Refer to Fig. 1 and 2 for the physical location of these features.

TABLE B

FEATURE	REF. DES.	FUNCTION
EQUIP Jack	J1A	Provides access to T and R leads on the equipment side.
LINE Jack	J1B	Provides access to T and R leads on the line side.
MON Jack (PGCU5R, PGCU8R)	J2	Provides access across the T and R leads for monitoring and testing purposes.
EQ OUT Jack (PGCU5T, PGCU8T)	J2	Provides access across the equalizer network. Used when setting proper equalizer options.

7. TECHNICAL SUMMARY

7.01 A summary of technical specifications for the units is given in Table C.

TABLE C

ITEM	SPECIFICATION
DC POWER	
Voltage	**Current Drain (nominal)**
5V	75 mA (PGCU5T and PGCU8T); 80 mA (PGCU5R and PGCU8R)
+12V	22 mA (PGCU5T and PGCU8T); 10 mA (PGCU5R and PGCU8R)
−12V	19 mA (PGCU5T and PGCU8T); 12 mA (PGCU5R and PGCU8R)
−48V	6 mA (PGCU5T and PGCU8T); 6 mA (PGCU5R and PGCU8R)
END-TO-END PERFORMANCE	
Frequency Response	
PGCU5T to PGCU5R	±0.5 dB, 50 Hz to 5 kHz; −3 dB at 6.2 kHz, minimum; −30 dB at 11 kHz, minimum
PGCU8T to PGCU8R	±0.5 dB, 50 Hz to 8 kHz; −3 dB at 9.4 kHz, minimum; −30 dB at 11 kHz, minimum
Impedance	150 or 600 ohms, selectable
Transmit and Receive Level Range	−22 to +9 vu in 1-dB steps
Overload Level (in and out)	+19 dBm at 9 vu point
Longitudinal Balance	60 dB, 50 Hz to 8 kHz
Signal-to-Distortion (End-to-End) at 1 kHz Program Weighted	**Measure** / **Meter Reading**
5 kHz	0 to −30 dBm0 / 33 dB
	−30 dBm0 / 33 dB
	−40 dBm0 / 27 dB
	−45 dBm0 / 23 dB
8 kHz	0 to −30 dBm0 / 35 dB
	−30 dBm0 / 35 dB
	−40 dBm0 / 29 dB
	−45 dBm0 / 25 dB

TABLE C (CONT)

ITEM	SPECIFICATION
Single Frequency Harmonic Distortion with 1 kHz + 15 dBm Test Tone at +8 vu Point	46 dB below test tone level at each harmonic
Idle Channel Noise (End-to-End)	20 dBrnc0, maximum
Crosstalk 400 Hz at 0 dBm0	
Message Channel to PGCU	−65 dB
PGCU to Message Channel	−65 dB
PGCU to PGCU	−48 dB
Foldover Distortion (5 kHz Test Tone)	40 dB below test tone
OPERATING ENVIRONMENT	
Temperature	0° to 55°C
Humidity	To 95% at 40°C (no condensation)
Altitude	To 14,000 ft (4,300 m)
DIMENSIONS	
Width	0.8 in. (1.9 cm)
Height	5.9 in. (15.0 cm)
Depth	9.7 in. (24.6 cm)
WEIGHT	0.5 lb (0.2 kg)

8. REPLACEABLE PARTS

8.01 These units have no field-replaceable parts.

9. REFERENCES

9.01 The engineering drawings listed in Table D were used in the preparation of this Section.

TABLE D

TYPE	DRAWING NO.
Assembly	628320-000
Schematic	628320-002
Assembly	628322-000
Schematic	628322-002
Assembly	628330-000
Schematic	628330-002
Assembly	628332-000
Schematic	623332-002

9.02 Related information on the units may be found in the ITTR Sections referenced in Table E.

TABLE E

TITLE	SECTION NO.
Connectorized Multiplex Shelf (MS/WC7, MS/WC5, MS/C7 and MS/C6), 628001, 628005, 628011 and 628015 (For 23-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-405
Connectorized Multiplex Shelf (MS19/WC7, MS19/WC5, MS19/C7 and MS19/C6), 628003, 628008, 628013 and 628018 (For 19-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-406
Program Channel Units — Option Selection, Installation, Installation Tests and Trouble Location	ITTR-18-460